

e|s|i®



292A universal impedance measuring system

- 0.05% resistance accuracy
- 0.1% capacitance, inductance accuracy
- simplified in-line readout of D or Q, measured value
- self-contained ac and dc generator-detectors
- front panel terminals provide access to all circuit elements



The Model 292A Universal Impedance Measuring System provides for precision measurements of resistance, conductance, inductance, and capacitance. Modern circuit design, close manufacturing tolerance, and the highest quality materials permit a conservative accuracy rating of 0.05% for resistance and conductance, 0.1% for inductance and capacitance. Comparative five-figure measurements can be made using the 120,005 divisions of dial resolution provided by the unique ESI DEKADIAL® decade dial.

The Model 292A system is designed for maximum versatility. Terminals are provided so that ranges may be extended and special circuit connections can be made. Use of four-terminal resistance connections increases the accuracy of low-resistance measurements. Three-terminal connections remove the effects of stray shunt circuits when high resistance or inductance or low capacitance is measured. DC bias can be applied when making inductance and capacitance measurements.

The system features the Model 290A Impedance Bridge, Model 803A DC Generator-Detector

and Model 860A AC Generator-Detector. The latter are especially designed as companions to the Model 290A bridge and provide generator and detector performance compatible with the high resolution and accuracy of the bridge.



DIMENSIONS

WIDTH 19.7 in. (50 cm)

HEIGHT 19.7 in. (50 cm)

DEPTH 14 in. (35.6 cm)

WEIGHT 53 lb (24 kg)

PRICE \$1285.00 f.o.b. Portland, Oregon

290A impedance bridge



The Model 290A Impedance Bridge is used to measure resistance, conductance, inductance, and capacitance. It is also used to measure the dissipation factor and storage factor of inductors and capacitors. Resistance and conductance measurements are usually made with direct current because of the increased accuracy and the lack of stray reactance effects. Resistance and conductance measurements can be made using alternating current, but they may require external reactance compensation. Inductance and capacitance measurements are made in terms of a two-element circuit with the same impedance as the unknown.

An important feature of the Model 290A bridge is its ability to measure small three-terminal capacitors without zero-capacitance correction and without the use of a separate guard circuit or Wagner ground. The bridge internal shielding eliminates internal stray capacitance in parallel with the unknown.

Stray capacitance external to the bridge can be eliminated by using a shielded lead to the point of measurement.

The accompanying table lists the ranges and corresponding accuracy values of the Model 290A bridge for its various applications. The diagrams show the equivalent circuits. The two curves illustrate the specified accuracy of the device for measurements of resistors and low-loss inductors and capacitors.

Dimensions: Width 19 in. (48.25 cm), height 5.25 in. (13.3 cm), depth 8 in. (20.3 cm).

Weight: 18.5 lb (8.4 kg).

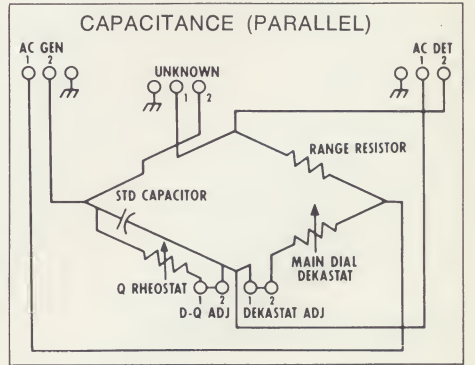
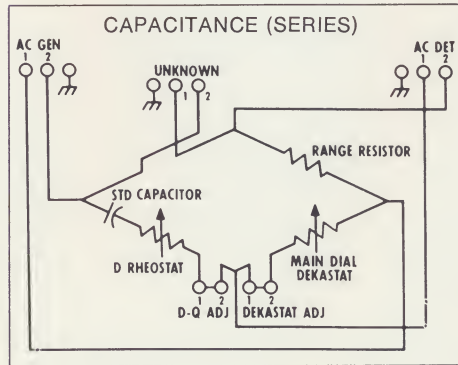
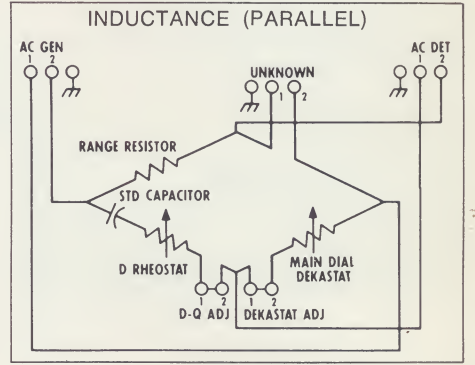
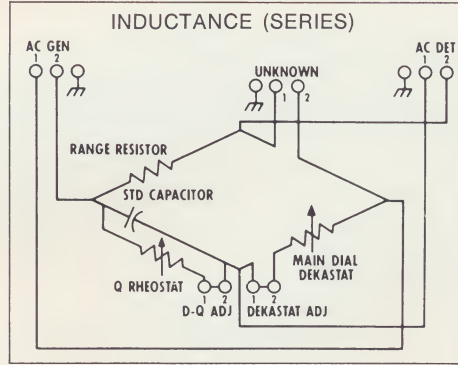
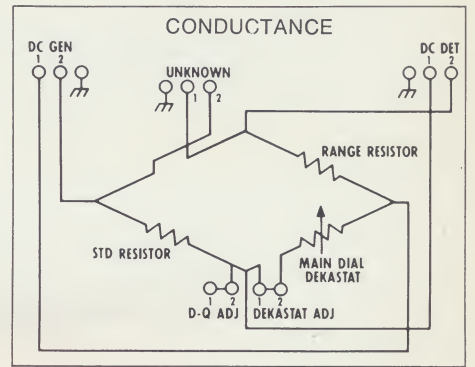
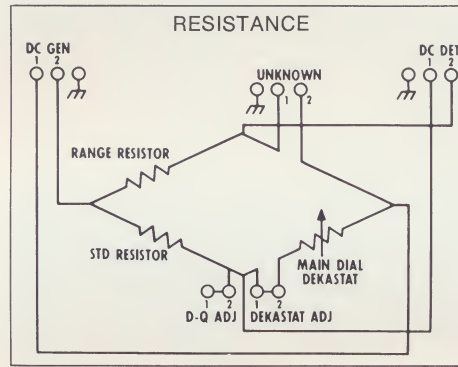
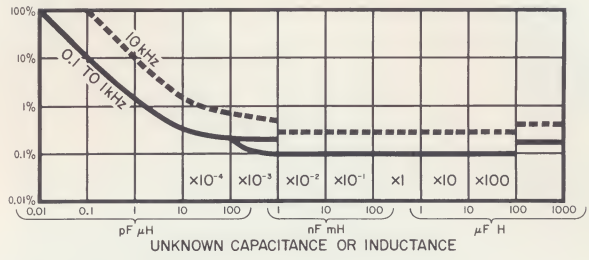
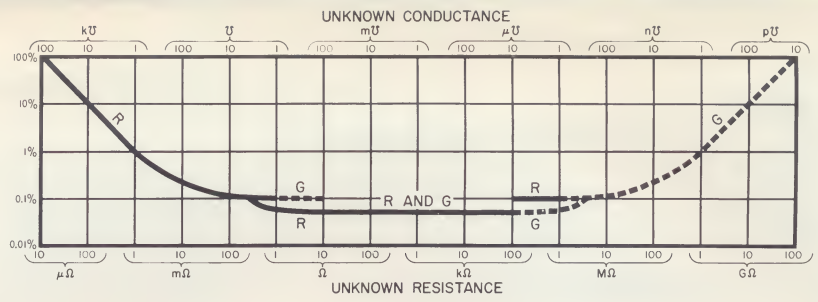
Price: \$495.00 f.o.b. Portland, Oregon.

U.S. Patents 2,786,122 and D-181,315.

FUNCTION	RANGES		ACCURACY*		
	MAGNITUDE	D OR Q	L,R,C,G RANGE	MAGNITUDE	D OR Q
Resistance	0-1200 k Ω in seven ranges**; 0.01 m Ω per dial division on lowest R range.		Highest	0.1% + 1 dial division	
			Other five	0.05% + 1 dial division	
			Lowest	0.1% + 1 dial division	
Conductance	0-1200 mmho in seven ranges; 10 pmhos (100 G Ω) per dial division on lowest G range.		Highest	0.1% + 1 dial division	
			Other five	0.05% + 1 dial division	
			Lowest	0.1% + 1 dial division	
Inductance (Series)	0-1200 H in seven ranges; 0.01 μ H per dial division on lowest L range.	Q = 0 to 10.5 \times f _k c in three ranges; 0.001 \times f _k c per dial division on lowest Q range.	Highest	0.2% + 1 dial division + 1.2% \times f _k c/Q	0.012 f _k c (1 + Q ²) + 0.02Q
			Other five	0.1% + 1 dial division + 0.7% \times f _k c/Q	0.007 f _k c (1 + Q ²) + 0.02Q
			Lowest	0.2% + 1 dial division + 0.7% \times f _k c/Q	0.007 f _k c (1 + Q ²) + 0.02Q
Inductance (Parallel)	0-1200 H in seven ranges; 0.01 μ H per dial division on lowest L range.	D = 0 to 10.5 \times f _k c in three ranges; 0.001 \times f _k c per dial division on lowest D range.	Highest	0.2% + 1 dial division + 1.2% \times D \times f _k c	0.012 f _k c (1 + D ²) + 0.02D
			Other five	0.1% + 1 dial division + 0.7% \times D \times f _k c	0.007 f _k c (1 + D ²) + 0.02D
			Lowest	0.2% + 1 dial division + 0.7% \times D \times f _k c	0.007 f _k c (1 + D ²) + 0.02D
Capacitance (Series)	0-1200 μ F in seven ranges; 0.01 pF per dial division on lowest C range.	D = 0 to 10.5 \times f _k c in three ranges; 0.001 \times f _k c per dial division on lowest D range.	Highest	0.2% + 1 dial division + 0.5% \times D \times f _k c	0.005 f _k c (1 + D ²) + 0.02D
			Other five	0.1% + 1 dial division + 0.5% \times D \times f _k c	0.005 f _k c (1 + D ²) + 0.02D
			Lowest	0.2% + 1 dial division + 1.0% \times D \times f _k c	0.010 f _k c (1 + D ²) + 0.02D
Capacitance (Parallel)	0-1200 μ F in seven ranges; 0.01 pF per dial division on lowest C range.	Q = 0 to 10.5 \times f _k c in three ranges; 0.001 \times f _k c per dial division on lowest Q range.	Highest	0.2% + 1 dial division + 0.5% \times f _k c/Q	0.005 f _k c (1 + Q ²) + 0.02Q
			Other five	0.1% + 1 dial division + 0.5% \times f _k c/Q	0.005 f _k c (1 + Q ²) + 0.02Q
			Lowest	0.2% + 1 dial division + 1.0% \times f _k c/Q	0.010 f _k c (1 + Q ²) + 0.02Q

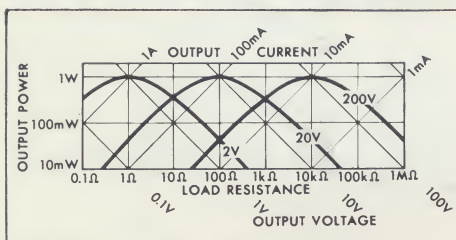
*Accuracy specifications for inductors and capacitors apply for units with reasonably high Q (low D) at frequencies near 1 kHz. Nominal frequency range is 100 Hz to 10 kHz, with slight accuracy derating near the limits.

**Equivalent resistance measurements to 100 G Ω are possible using conductance ranges.





803A dc generator-detector



The Model 803A DC Generator-Detector combines a guarded dc source and a highly sensitive dc detector. Special guarding makes possible very-high-resistance bridge measurements with superior accuracy.

DC GENERATOR

Ranges: Three, 2 to 200 V full-scale, power-limited to 1 W.

Resistance to Chassis: Guarded terminal 1 greater than $10^{14} \Omega$; guard terminal 2 greater than $10^{11} \Omega$.

Output Control: Continuously variable from 0 to 1 W into matched load.

DC DETECTOR

Ranges: Five. Seven-position switch provides five decade sensitivity ranges and two input-shorting positions.

Sensitivity: Continuously variable through 80 dB range.

Minimum Detectable Signal: 5 μV or better.

Input Impedance: Greater than 500 k Ω .

Long-Term Zero Stability: $\pm 5 \mu\text{V}$ or better.

AC Rejection: At least 70 dB at 50 Hz, improving at all higher frequencies.

Overload Protection: Up to 600 V across input terminals at any sensitivity setting.

Overload Recovery Time: Recovery within 5 sec for overloads of 10,000 times minimum detectable signal.

Source Impedance: No zero shift or damping response change from short-circuit to open-circuit conditions.

Stabilization Time: 60 sec or less after switching on.

Resistance to Chassis: Guard terminal 1 greater than $10^{11} \Omega$; guarded terminal 2 greater than $10^{13} \Omega$.

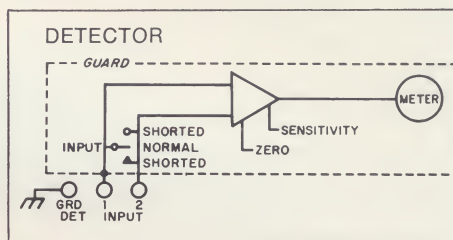
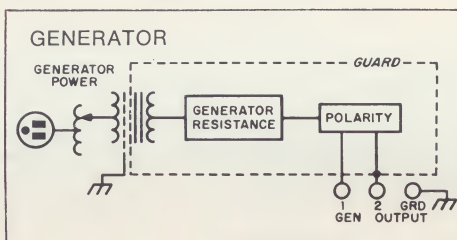
Power Requirement: 117 VAC, 50 to 400 Hz, 10 W.

Dimensions: Width 19 in. (48.25 cm), height 5.25 in. (13.3 cm), depth 7 in. (17.8 cm).

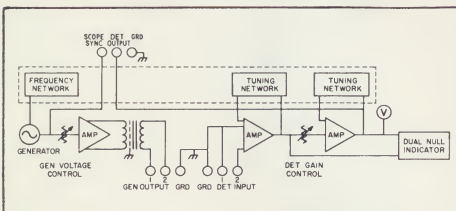
Weight: 10 lb (4.5 kg).

Price: \$395.00 f.o.b. Portland, Oregon.

Patent pending



860A ac generator-detector



The Model 860A AC Generator-Detector is a matched generator and sensitive detector. The generator section provides up to 15 volts output and is power-limited to 0.5 watt for circuit protection. The detector is tuned to the generator frequency to minimize harmonic response and hum pickup. Frequency is adjustable by use of easily replaceable front panel networks.

AC GENERATOR

Frequency: Determined by plug-in unit.

Output: Variable from 0 to approx 15 V, with internal resistance of approx 600 Ω which protects load from power in excess of 0.5 W and maintains sinusoidal waveform into any load impedance from open-circuit to short-circuit.

Output Isolation: Transformer output, less than 30 pF total capacitance to case.

Scope Sync Output: Constant-output terminal provided for oscilloscope sync or sweep signal.

AC DETECTOR

Frequency: Two tuned amplifier stages tuned to generator frequency.

Selectivity: Typical rejection 30 to 40 dB at one-half and two times frequency.

Sensitivity: Continuously variable; better than 20 μV minimum detectable signal.

Null Indication: Meter and electron-ray tube combination provides instantaneous response to signal changes over 100 dB range.

Detector Output: Output terminal provided for oscilloscope display.

FREQUENCY-DETERMINING NETWORKS

One 1 kHz network supplied. Table lists frequencies available from stock; others available on special order. Accuracy $\pm 1\%$.

FREQUENCY	ESI PART NO.	PRICE
60 Hz	3452	\$40.00
100 Hz	3447	40.00
120 Hz	3451	40.00
400 Hz	3449	40.00
1 kHz	3446	30.00
10 kHz	3448	30.00

Power Requirement: 115 V, 50 to 400 Hz, 17 W.

Dimensions: Width 19 in. (48.25 cm), height 3.5 in. (8.9 cm), depth 8 in. (20.3 cm).

Weight: 10 lb (4.5 kg).

Price: \$295.00 f.o.b. Portland, Oregon.

interconnection kit

Kit is supplied with system. Order if instruments are purchased separately.

Part No.: 2878

Price: \$46.00 f.o.b. Portland, Oregon.

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